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W. K. BRASHER, M.A., M.I.E.E.

SECRETARY

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### *Oliver Heaviside*

FROM time to time there live among us men of genius whose creative work is often inadequately recognized by their contemporaries but who, later, are found to have rendered service of the highest value to the advancement of science. Such a man was Oliver Heaviside, the centenary of whose birth The Institution will commemorate on the 18th May.

Heaviside had very little formal education; certainly none in the higher branches of mathematics. He started adult life as an ordinary telegraph operator, but he seems to have had a native faculty for mathematics, which he soon applied to the practical problems of telegraphy. His interest quickly extended to more recondite problems, and before many years had passed he was filling the pages of *The Electrician* with papers which were far too difficult for most readers of that journal. They were not alone. The difficulty of some of the papers which he submitted to the Royal Society dealing with applications of Maxwell's theory of electromagnetic wave propagation proved a stumbling-block to the Society's referees, while his unorthodox mathematical methods—which he justified only by the exhaustive tests which he applied to his results—alienated the classical mathematicians who attempted to follow his writings. It is only comparatively recently that his development of the operational calculus in these papers has been recognized as one of the most important mathematical advances of the last quarter of the nineteenth century. Methods very similar to those he introduced have to-day become powerful and invaluable tools in modern circuit theory for determining the transient response of complex networks and for the analysis of servo mechanisms.

Although it is probably as a mathematical physicist that Heaviside will chiefly be remembered, it was his constant concern that the practical implications of his work should be recognized and utilized by engineers. When, therefore, he advocated the addition of inductance to telephone and telegraph cables as a means of improving the transmission of signals, and his ideas did not find ready acceptance, he was bitterly disappointed. Later his methods were widely adopted and proved of great practical value, particularly in the era immediately preceding the introduction of modern methods of long-distance speech trans-

mission by carrier telephony. In the public mind, however, his name, coupled with that of the American engineer, Kennelly, is usually associated with that of the reflecting layer in the upper atmosphere that makes round-the-world radiocommunication possible. This is due to a remark which he made in one of his many articles on the propagation of electromagnetic waves through space. His grasp of the problem showed him clearly that if the layer were there it would perform the function of bending the waves round the earth.

Heaviside was, for a time, a member of the Society of Telegraph Engineers, as The Institution was called in its early days. The Institution will be happy to honour the memory of this former member at the meeting on the 18th May, when papers will be read relating to his work, and tributes will be paid by eminent engineers and scientists. The Institution will also publish for the first time a number of important theorems which have been extracted from the loose papers and exercise books containing the mathematics upon which he had worked during the later years of his life. Some of the notes were devoid of descriptive writing and contained only bare mathematical outlines. It was probably his intention to use these in the fourth and concluding volume of his work on Electromagnetic Theory which was never published, although a manuscript draft of part of the volume has recently been identified. Fortunately, however, The Institution purchased, in 1927, many of the papers left by Heaviside. These now form part of our collection of historic documents, and H. J. Josephs, who has studied them, will present the new theorems. They, together with the papers read at the meeting, will be published in a special issue of the *Proceedings*.

Unfortunately, Heaviside's disposition and temperament largely cut him off from his fellow-men. Towards the end of his life he lived alone in what appeared to be a state of considerable poverty, cooking his own food, waiting on himself and suffering from indifferent health. It is therefore some consolation to know that he was the first recipient of The Institution's most distinguished award, the Faraday Medal, and that our President at the time journeyed specially to Heaviside's home in order to present it.

W. G. R.